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8 Charles Street
London W1J 5DJ

Planning Compliance Report
Report 27545.PCR.01.RevA

Park Properties Investments Ltd

Report 27545.PCR.01 Revision History			
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KP acoustics

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1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Park Properties Investments Ltd to undertake a noise impact assessment of a plant installation serving Flat 1, 8 Charles St, London W1J 5DJ.

An environmental noise survey has been undertaken on site for at least 24 hours and the background noise levels measured will be used to determine daytime and night-time noise emission criteria for an existing plant installation, in agreement with the planning requirements of Westminster City Council (WCC).

This report presents the overall methodology and results from the environmental survey, followed by calculations to demonstrate the feasibility of the plant unit installation to satisfy the emissions criterion at the closest noise-sensitive receiver. Mitigation measures will be outlined as appropriate, if required.

2.0 SITE SURVEYS

2.1 Site Description

As shown in Figure 2.1, 8 Charles Street is bounded by residential properties to the north, west and east and Charles Street to the south. Flat 1 occupies the ground floor and basement of the building.

Figure 2.1 Site Location Plan (Image Source: Google Maps)

Initial inspection of the site revealed that the background noise profile at the monitoring location was typical of an urban cityscape environment, with the dominant source being road traffic noise from the surrounding roads.

2.2 Noise Survey Procedure – Background Noise Levels

Continuous automated monitoring was undertaken for the duration of the noise survey period between 14:48 on 24/10/2023 and 13:13 on 26/10/2023.

The environmental noise measurement position, plant installation location, and the closest noise sensitive receivers relative to the plant installations are described within Table 2.1 and shown within Figure 2.2.

Icon	Descriptor	Location Description
1	Noise Measurement Position 1	The microphone was installed on a pole fixed at high level in the lightwell outside the front of the site. The microphone was elevated to be at a height of 1m above street level. The position is shown in Figure 2.2. The microphone was not considered to be in free-field conditions.
	Nearest noise sensitive receptors	Front façade, Ground Floor window, residential properties to the east and west.
	Proposed plant installation location	Proposed plant installations are outlined in Section 5.1.

Table 2.1 Measurement positions and descriptions

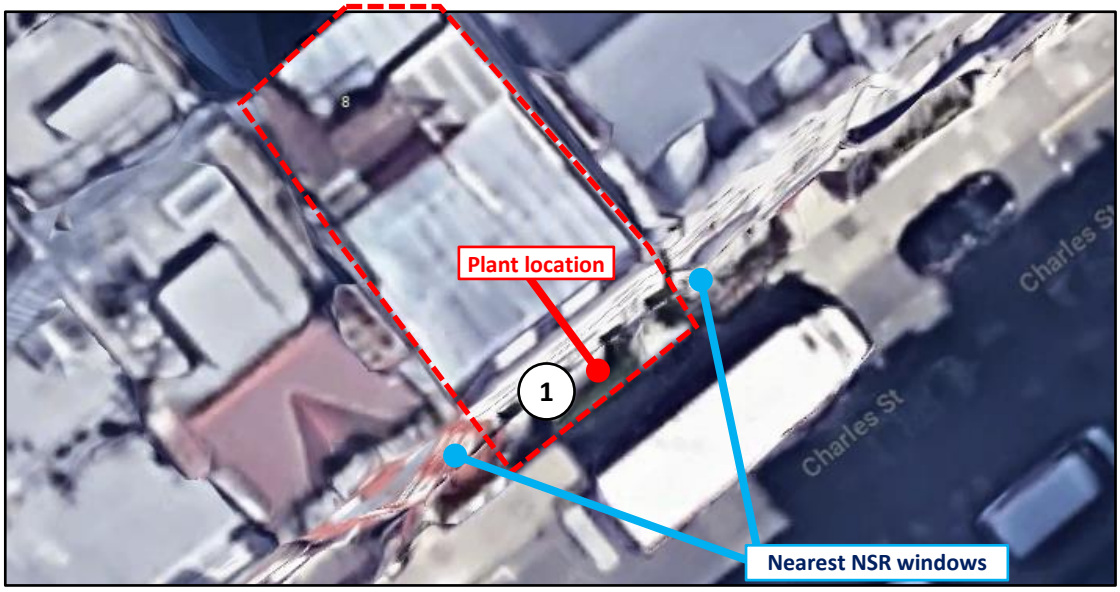

Figure 2.2 Site measurement positions (Image Source: Google Maps)

The choice of the position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receiver.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Noise Survey Procedure – Plant Noise Levels

Further continuous automated monitoring was undertaken for the duration of the noise survey between 17:19 on 31/10/2023 and 09:04 on 01/11/2023. An overnight survey was chosen after initial subjective assessment on site indicated that the plant noise levels during daytime were below ambient levels and therefore could not be measured. The ambient noise levels were expected to drop during night time and allow more representative plant noise measurements to be made.

The measurement position was in the lightwell by the louvres of the plant installation. The microphone was installed on a pole at a height of approximately 1.5m above local ground level and approximately 1m from the plant louvres. The choice of the position was based on collecting noise levels representative of the noise emissions from the plant installation for use in assessing the impact on the nearby properties.

It is understood that the plant installation was operating at the design duty for the duration of the survey.

2.4 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 37	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21302-E0	12/09/2023	UK-23-103
	Free-field microphone NTI Acoustics MC230A	A23082		
	Preamp NTI Acoustics MA220	13798		
	NTI Audio External Weatherproof Shroud	-	-	-

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 38	NTI Audio XL2 Class 1 Sound Level Meter	A2A-23182-E1	12/09/2023	UK-23-104
	Free-field microphone NTI Acoustics MC230A	A25833		
	Preamp NTI Acoustics MA220	13818		
	NTI Audio External Weatherproof Shroud	-	-	-
Larson Davis CAL200 Class 1 Calibrator		17148	21/03/2023	UCRT23/1363

Table 2.2 Measurement instrumentation

3.0 RESULTS

3.1 Environmental Noise Survey

The $L_{Aeq,5min}$, $L_{Amax,5min}$, $L_{A10,5min}$ and $L_{A90,5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 27545.TH1.

Minimum background noise levels and external ambient $L_{Aeq,T}$ noise levels are shown in Table 3.1 for daytime and night-time.

Time Period	Minimum background noise level L_{90} dB(A)	Average ambient noise level $L_{eq,T}$ dB(A)
Daytime (07:00-23:00)	44	61
Night-time (23:00-07:00)	39	57

Table 3.1 Minimum background noise levels and average ambient noise levels

Please note that the measurements position was at a distance of approximately 1 metre from the nearest reflective surface and therefore a 3dB correction has been applied to the results in Table 3.1 to obtain a free-field measurement as per ISO1996 Part 2.

3.2 Plant Noise Survey

The $L_{Aeq,5min}$, $L_{Amax,5min}$, $L_{A10,5min}$ and $L_{A90,5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 27545.TH2.

The noise level from the plant installation has been taken from the lowest typical $L_{A90,5min}$ level that was measured during the survey. As the site is next to a road, it is expected that traffic and pedestrian noise was present throughout the night causing the noise levels to fluctuate;

the results as shown in 27545.TH2 support this premise. Using the $L_{A90,5min}$ levels to determine the plant noise levels mitigates the impact of the fluctuations due to extraneous sources, allowing a more accurate assessment.

The most commonly measured $L_{A90,5min}$ noise level, which was also the second lowest, was 45 dB, occurring 30 times or 31% of the overall night-time period. The lowest measured $L_{A90,5min}$ noise level was 44 dB, which occurred only 9 times of 10% of the night-time period. The next highest occurring was 47 dB, which occurred only 16 times or 17% of the night time period.

The octave band data for all intervals in which 45 dB $L_{A90,5min}$ was measured has been averaged to determine spectral levels for the plant. The calculated plant noise levels at the measurement position are as shown in Table 3.2 below.

Sound Pressure Level at 1m (dB) at Octave Band Centre Frequency (Hz)								Overall (dBA)
63	125	250	500	1k	2k	4k	8k	
53	51	45	43	39	34	28	22	45

Table 3.2 Calculated plant noise levels

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Local Authority Guidance

The guidance provided in Westminster City Council's *City Plan: 2019-2040 Draft Technical Guidance Note (November 2019)* states the following with regards to sources of noise and vibration:

"2.4 Minimising noise from plant machinery and internal/external activities

Development including plant or machinery, or contains activities that cause noise from amplified and unamplified music or human voices both internally and externally should achieve the following standards:"

Existing External Ambient Noise Level	Tonal or Intermittent Noise/ Noise Source	Sound Emission Level that should not be Exceeded at the nearest Noise Sensitive Receptor
Exceed WHO Guideline levels. L_{Aeq} 55 dB over periods of daytime (07.00-23.00hrs) and L_{Aeq} 45 dB at night-time (23.00-07.00hrs).	Does not contain tones or intermittent noise sufficient to attract attention.	10dB below the minimum external background noise level
	Contains tones or be intermittent noise sufficient to attract attention.	15dB below the minimum external background noise level
	Noise emitted from emergency plant or emergency life supporting generators.	10dB above the lowest background noise level within a 24-hour period
Does not exceed WHO Guideline levels. L_{Aeq} 55 dB over periods of daytime (07.00-23.00hrs) and L_{Aeq} 45 dB at night-time (23.00-07.00hrs).	Does not contain tones or intermittent noise sufficient to attract attention.	5dB below the minimum external background noise level
	Contains tones or be intermittent noise sufficient to attract attention.	10dB below the minimum external background noise level
	Noise emitted from emergency plant or emergency life supporting generators.	10dB above the lowest background noise level within a 24-hour period
Below 30 dB $L_{A90.\ 15min}$ at the nearest noise sensitive receptors Both daytime (07.00-23.00hrs) and night-time (23.00-07.00hrs)	Noise contains and/or does not contain tones or intermittent noise	Site specific standards that avoid noise disturbance to nearest noise sensitive receptors may be considered

Table 4.1 Noise criteria for plant machinery as provided by Westminster City Council's Draft Noise Technical Guidance Note

4.2 Noise Emissions Criterion

The proposed plant could be used at any time of the day or night. Considering which of the conditions set by the guidance shown in Table 4.1 are met by the noise levels measured during the environmental noise survey, the noise criterion has been set as shown in Table 4.2 in order to comply with the above requirements.

Operation	Maximum Plant Noise Emissions Criterion at Nearest Residential Receiver
24 hours	29 dB(A)

Table 4.2 Proposed noise emissions criterion

5.0 NOISE IMPACT ASSESSMENT

5.1 Proposed Plant Installations

It is understood that the plant installation is comprised of the following units:

- 1 No. Mitsubishi MXZ-5D102VA
- 2 No. Sanyo SPW-CR483GVH8

The plant is installed in vaults under Charles Road, which open to the basement lightwell via a weather louvre. The plant noise emission levels have been calculated as shown in Table 3.2 above.

5.2 Closest Noise Sensitive Receiver

The closest noise sensitive receiver to the proposed installation location has been identified as being the ground floor residential windows of the adjacent properties (7 and 9 Charles Street) to the east and west, located approximately 4 metres from the proposed plant installation location, as shown in Figure 2.2.

5.3 Calculations

Taking all acoustic corrections into consideration, the noise level contribution expected at the closest residential windows from the plant is as shown in Table 5.2. Detailed calculations are shown in Appendix B.

Receiver	Criterion	Noise Level at 1m From the Closest Noise Sensitive Window
Ground floor residential windows of 7 and 9 Charles Street	29dB(A)	29dB(A)

Table 5.1 Predicted noise level and criterion at nearest noise sensitive location

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive windows due to the effects of the plant installation satisfies the emissions criterion of Westminster City Council, providing that the mitigation measures outlined in Section 6 are implemented.

5.4 BS8233:2014 Assessment

Further calculations have been undertaken to assess whether the noise emissions from the plant unit installation would be expected to meet the recognised British Standard recommendations internally within the closest residence, in order to further ensure the amenity of nearby noise sensitive receivers.

The calculated noise emission value of 29dB(A) is to be considered externally at 1m from the receiving window. Windows may be closed or partially closed leading to further attenuation.

British Standard 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' provides recommendations for acceptable internal noise levels in residential properties, as shown in Table 5.3.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB(A)	-
Dining	Dining Room/area	40 dB(A)	-
Sleeping (daytime resting)	Bedrooms	35 dB(A)	30 dB(A)

Table 5.2 BS8233 recommended internal background noise levels

Assuming worst case conditions, of the closest window being for a bedroom, BS8233 recommends 30dB(A) for internal resting/sleeping conditions during night-time hours.

With a calculated external level of 29dB(A), the residential window itself would not need to provide any additional attenuation in order for the recommended internal noise conditions to be achieved.

According to BS8233:2014, even a partially open window offers 10-15dB attenuation, thus leading to a further reduced interior noise level as shown in Table 5.4.

Receiver	BS8233 Criterion for Daytime/Night-time	Noise Level Inside Nearest Residential Receiver
Inside ground floor residential windows of 7 and 9 Charles Street	29dB(A)	14-19dB(A)

Table 5.3 Noise levels and criteria inside nearest residential space

Predicted levels are shown in Table 5.4, with detailed calculations shown in Appendix B. It can therefore be stated that, as well as complying with the requirements of Westminster City Council, the noise emissions from the plant unit installation would be expected to comfortably meet the most stringent recommendations of BS8233.

6.0 NOISE CONTROL MEASURES

In order to achieve the specific sound level and subsequent rating level shown in the assessment above, the following noise control strategy should be adopted.

6.1 Acoustic Louvres

In order to control the noise emissions from the plant installation, we would recommend that the louvres to the vaults which contain the plant are replaced with acoustically-rated units which should provide the minimum transmission losses shown in Table 6.1.

Transmission Loss (dB) in each Octave Band Centre Frequency							
63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**
6	6	8	10	14	18	16	15

Table 6.1 Transmission loss figures to be provided by acoustic louvres

6.2 Suitable Suppliers

We would recommend the following suppliers of the aforementioned louvres:

- Environmental Equipment Corporation
- IAC
- Noico Ltd
- Waterloo Acoustics
- Allaway Acoustics
- Wakefield Acoustics
- Environ

7.0 CONCLUSION

An environmental noise survey has been undertaken at 8 Charles St, London W1J 5DJ, by KP Acoustics Ltd. The results of the survey have enabled criteria to be set for noise emissions.

Using noise data form a further survey of the installed plant, noise levels are predicted at the nearby noise sensitive receivers for compliance with current requirements.

Calculations show that noise emissions from the plant installation would meet the requirements of Westminster City Council, providing that the mitigation measures outlined in Section 6 are implemented.

Further calculations have been undertaken with regards to the relevant British Standard and it has been ensured that the amenity of nearby residential receivers will be protected.

8 Charles Street, Mayfair - Position 1
Environmental Time History
24/10/2023 to 26/10/2023

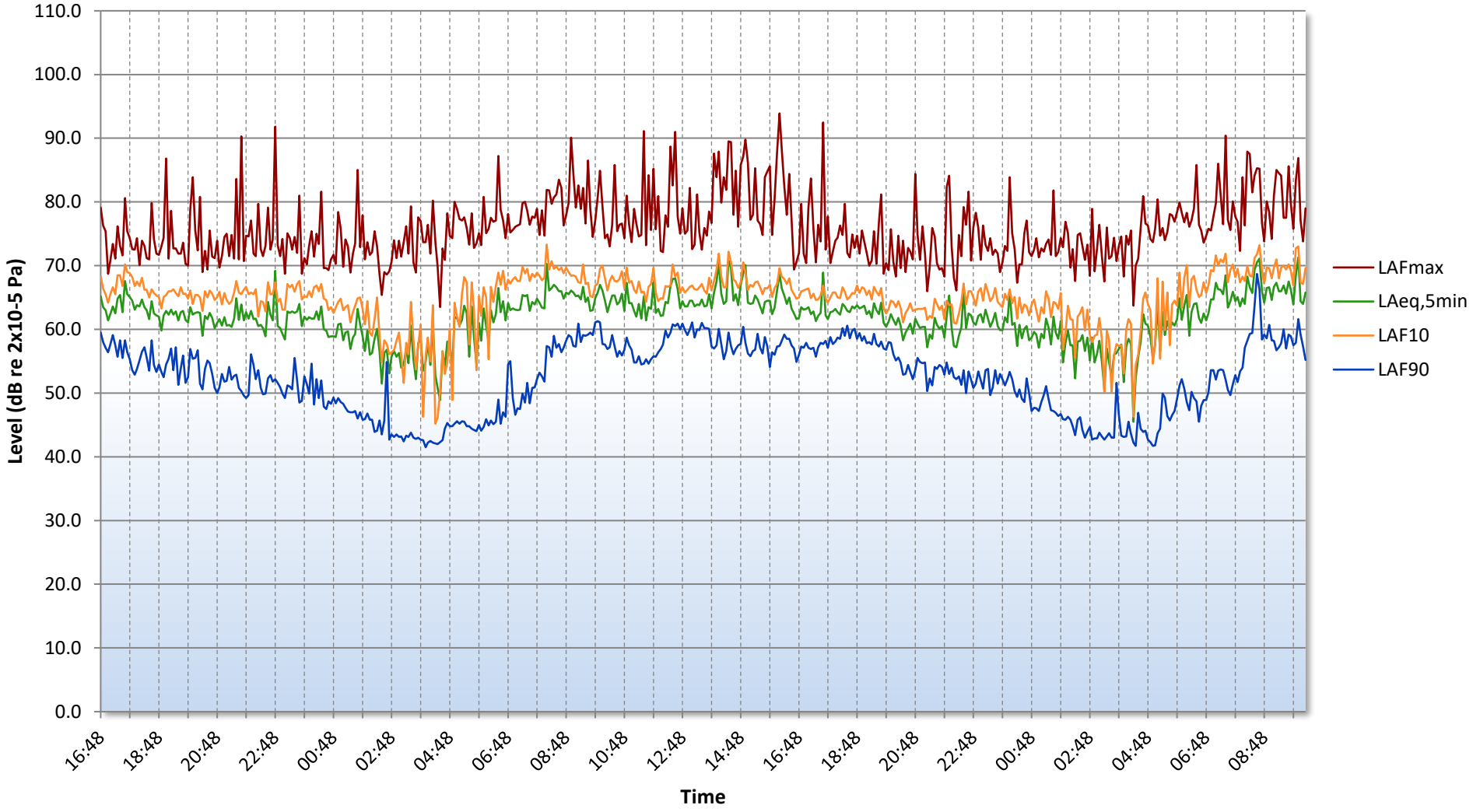

Figure 27545.TH1

8 Charles Street, London W1J 5DJ - Position 2
Environmental Time History
31/10/2023 to 01/11/2023

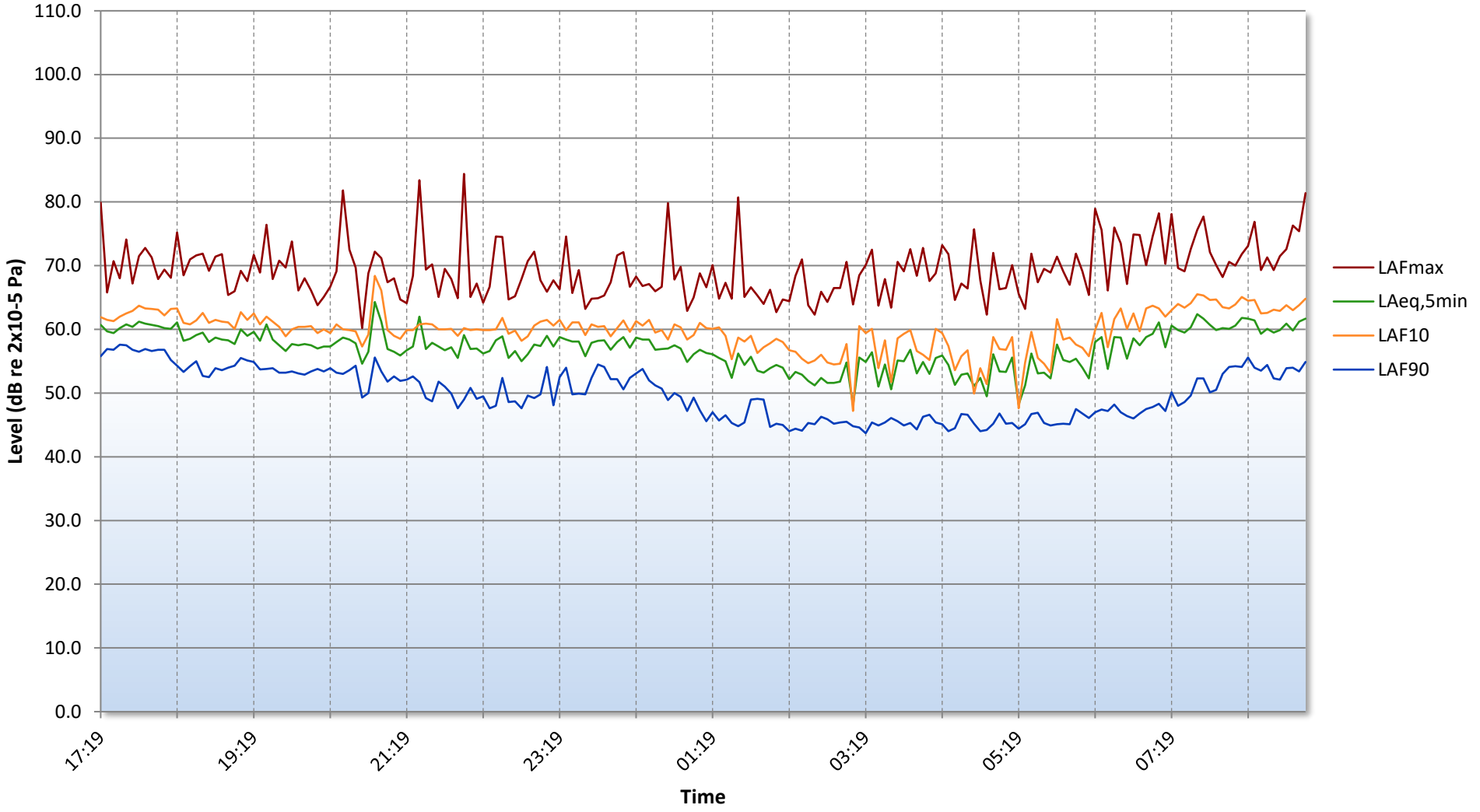

Figure 27545.TH2

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B

8 Charles St, London W1J 5DJ

PLANT NOISE EMISSIONS CALCULATIONS

Source: Plant in Front Lightwell Receiver: Ground Floor, 7 Charles Street	Frequency, Hz 63	125	250	500	1k	2k	4k	8k	dB(A)
Mitsubishi MXZ-5D102VA									
Measured SPL in Lightwell (dB)	53	51	45	43	39	34	28	22	45
Correction for distance loss (2m)	-6	-6	-6	-6	-6	-6	-6	-6	
Tranmission losses of acoustic louvre, dB	-6	-6	-8	-10	-14	-18	-16	-15	
Total Rating Noise Level of all Plant Unit Installations at Receiver	**41**	**39**	**31**	**27**	**19**	**10**	**6**	**1**	**29**

Design Criterion	**29**